

### **Limited Visual Dam Safety Inspection Summary Report**

MA-073

Reservoir 24

Maui, Hawaii

### Prepared by:

U.S. ARMY CORPS OF ENGINEERS HONOLULU ENGINEER DISTRICT

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

May 2006

	D: <u>MA-073</u>
Name: Reservoir 24	: Reservoir 24

Limited Visual Dam Safety Inspection Conducted on: 05 April 2006

### I. Purpose

Due to disaster occurrences of periodic heavy rains and flooding, which has caused extensive damage to property and loss of lives, the Governor has issued a State of Emergency Proclamation extending from February 20, 2006 to April 9, 2006. In light of the tragic failure of the Kaloko dam on Kauai and the continued forecast of heavy rains, emergency inspections of all regulated dams in all counties are being undertaken.

These inspections are for the purpose of determining if any of the regulated dams and reservoirs in the City and County of Honolulu, Maui County or Hawaii County, are suspect for immediate concern to the downstream area under the prolonged conditions of heavy rain showers.

#### II. Authority

Inspections are authorized under the Hawaii Dam Safety Act of 1987, Chapter 179D "Dams and Reservoirs" of Hawaii Revised Statues, and Title 13, Subtitle 7, Chapter 190, "Dams and Reservoirs" of the Hawaii Administrative Rules.

These inspections are being conducted under joint agreements of the U.S. Army Corps of Engineers (USACE), the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS), and the State of Hawaii. The Memorandum of Agreement with the U.S. Army Corps of Engineers is entered into pursuant to 10 U.S.C. § 3036(d)(2), and the Intergovernmental Cooperation Act (31 U.S.C. §6505), and established via support agreement number DL-06-01.

### III. Scope

Visual inspection will be made on parts of the embankment and appurtenant works readily available and visible for inspection by the inspection team at the time of the inspection. Such parts and appurtenant works would include the upstream slope, crest, downstream slope, abutments and toes, outlet works, and spillway.

On the date of this limited visual inspection, there may appear to be no immediate threat to the safety of the dam, however no assurance can be made regarding the dam's condition after this date. Subsequent adverse weather and other factors may affect the dam's condition.

Dam ID:	MA-073	
Name: R	eservoir 24	_

#### IV. **Limitations of Findings and Recommendations**

The inspection is based only on visible features/areas of the dam on the day of inspection. The inspection does not entail detailed stability, hydrologic, hydraulic, or seismic investigations. This inspection is not a formal phase I or phase II dam safety inspection and does not include a review or evaluation from each specialist of an inspection team, such as a geologists, civil, geotechnical, structural, or hydraulics engineer. The owner should verify the findings of this report and take corrective actions. The owner may submit to the State alternative corrective actions that are certified by a licensed professional engineer in the State of Hawaii experienced in the design and construction of dams. This inspection does not relieve the owner/operator from their responsibility to conduct routine inspections, maintenance, repairs, modifications, monitoring, documentation, and/or investigative studies.

٧. **Inspection Team** 

> Organization Name /Title Jon Kolber

Corps of Engineers

Geotechnical Engineer

State of Hawaii, Dept. of Land and Natural Resources Eric Yuasa

Civil Engineer

USDA, Natural Resource Conservation Service Diana Perry

> Michael Hayama Civil Engineer

VI. **Owner's Representatives Present** 

> Hawaiian Commercial and Sugar Company. Randall Moore East Maui Irrigation Company **Garrett Hew**

VII. **Summary Report Team** 

> Organization Name Corps of Engineers Derek Chow Bill Empson

State of Hawaii, Dept. of Land and Natural Resources Denise Manuel

Edwin Matsuda

VIII. Dam Type

The dam appeared to be an earthen embankment dam.

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#### IX. Dam Classification

The current hazard classification of this dam is: High

Hazard Potential Classification based on the following:

Category	Loss of Life	Economic Loss		
Low	None Expected	Minimal (undeveloped to		
		occasional structures		
		or agriculture)		
Significant	Few (No Urban development and no more than a small number of inhabitable structures)	Appreciable (Notable agriculture, industry or structures)		
High	More than a few	Extensive community, industry or agriculture.		

Based on inventoried storage and height data, the size classification of the dam is: Most likely Small.

Size Classification based on the following:

Category	Storage (Acre-Feet)	Height (feet)
Small	< 1000	< 40
Intermediate	> 1000 and < 50,000	> 40 and < 100
Large	> 50,000	> 100

### X. Summary of Inspection

Condition Rating Criteria: The conditional terms in this report are used to generally describe the conditions below. Inspections, monitoring, and additional investigations are considered to be incidental to all condition ratings.

Satisfactory	Expected to fulfill intended function.
Fair	Expected to fulfill intended function, but maintenance is recommended.
Poor	May not fulfill intended function; maintenance or repairs are necessary.
Unsatisfactory	Is not expected to fulfill intended function; repair, replacement, or modification is necessary.
Unknown	Not visible, not accessible, not inspected, or unable to determine the condition rating based on the observation taken.

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Name: R	eservoir 24	

#### A. General appearance:

This reservoir was completed in 1917 and continues to operate as an irrigation control structure. The dam is 35 feet high and 400 feet long. The reservoir appears to have a significant drainage area. Per the owner, it has been dry since 1989.

A dam safety incident occurred in the past when reservoir filled and the dam was overtopped. Additional details are not available.

Findings and Corrective Actions:

- a. The Owner shall maintain documentations including Construction plans, specifications, improvements, modifications, Operations and Maintenance Manuals and routine inspection logs for this dam facility.
- b. An EAP is required for High Hazard Dams. Submit an updated EAP for this facility.
- c. Routine inspection logs were not inspected.
- d. Dam owners shall provide for routine inspection of the dam.
- e. Access to site appears to be satisfactory.
- f. Submit current Operations and Maintenance Manual or Procedures for this dam / reservoir facility.
- g. Provide a detailed narrative of the incident, responses taken, and any damages incurred. Dam owners are required to promptly advise the department of any sudden or unprecedented flood or unusual or alarming circumstance or occurrences, which may adversely affect the dam or reservoir.
- h. Emergency Alarms / Monitors: There were no alarms or monitors observed on this reservoir.
- Power / Communication: There were no communication systems observed on this reservoir.

#### B. Access / Security:

Access to the dam was accomplished via a dirt access road. A four-wheel drive vehicle is not required but useful to gain access to the reservoir (dry at the time of this inspection). A four-wheel drive vehicle would be required for access during severe weather conditions.

Security issues. Access to the dam is unrestricted.

#### C. Intake Works: (Satisfactory)

Water flows into the reservoir by surface flow through a ditch. Since 1989, per the owner, this dam has been kept dry by diverting water away from this reservoir.

Findings and Corrective Actions:

- a. The intake works were not inspected.
- b. The intake works appeared to be in satisfactory condition. No corrective actions are required at this time.

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#### D. Reservoir: (Satisfactory)

The reservoir was 0 feet per gage (dry) at the time of inspection. The normal operating level is 0 to 27 feet per gage. Per the owner, this dam has been kept dry since 1989.

Findings and Corrective Actions:

a. The reservoir appeared to be in satisfactory condition, no corrective actions are required at this time.

#### E. Upstream Slope: (Satisfactory)

The upstream slope is concrete lined on a 1 on 1 slope.

Findings and Corrective Actions:

a. The upstream slope appeared to be in satisfactory condition. No corrective actions are required at this time.

### F. Crest: (Satisfactory)

The dam crest was approximately 20 feet wide.

Findings and Corrective Actions:

- a. The dam crest appeared to be in satisfactory condition, no corrective actions are required at this time.
- b. Access along the crest was satisfactory.

#### G. Downstream Slope: (Fair)

The downstream slope was approximately 1 on 1. Bushes and tall grass were growing on the downstream slope, obscuring it from visual inspection.

Findings and Corrective Actions:

- a. The downstream slope appeared to be in fair to poor condition and requires corrective action.
- b. Slope protection needs maintenance. Need to remove tall vegetation from the downstream slope.
- c. The downstream slope was not visible due to high grass and bush vegetation. Clear high vegetation and maintain low to enable easy inspection.
- d. The slope was very steep, around a 1 on 1 slope. Further study is required to verify slope stability.

#### H. Abutments / Toe: (Fair)

The abutments were obscured by bushes and other tall vegetation.

Findings and Corrective Actions:

a. The abutments/toe appeared to be in fair to poor condition and requires corrective action.

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- b. The slope protection needs maintenance by removing tall growth from the abutments.
- c. The abutment area was not visible due to tall vegetation. Clear high vegetation to enable easy visual inspection.

#### I. Outlet Works: (Satisfactory)

The outlet works consist of a 24-inch diameter DIP pipe controlled on the downstream side of the dam by a valve. The valve is left open.

Findings and Corrective Actions:

- a. The outlet works were not tested.
- b. The outlet works appear to be in satisfactory condition. No corrective actions are required at this time.

### J. Spillway: (Satisfactory)

This spillway consisted of a concrete weir 5 feet wide by 4 feet deep, which carries flow into a culvert.

Findings and Corrective Actions:

a. The Spillway appeared to be in satisfactory condition, no corrective actions are required at this time.

#### K. Down Stream Channel: (Unsatisfactory)

The downstream channel is too small to contain flow from this dam. Houses exist along the flood plain downstream of the dam. To avoid downstream impacts, this dam has been kept dry since 1989.

Findings and Corrective Actions:

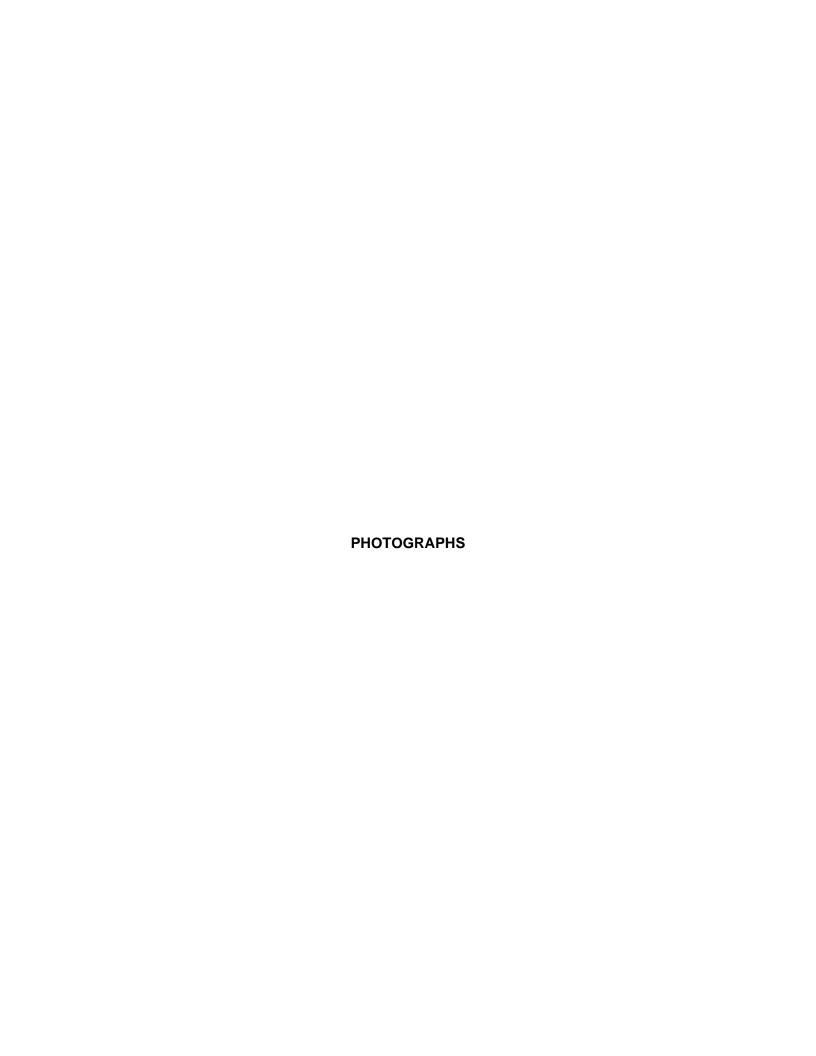
- a. The downstream channel was not inspected.
- b. The downstream channel appeared to be in unsatisfactory condition and not expected to fulfill it intended function. Urgent corrective action is required.

#### XI. Additional Comments:

Based on visual observations and discussion of operational procedures of the day, there is no immediate threat to the safety of the dam at this time.

Reservoir kept dry because of the potential to overtop the downstream channel. The channel appears to be too small. There is a hydroelectric plant immediately downstream of the embankment that is no longer used.

Reservoir is kept dry since the downstream channel is inadequate to pass outlet works and spillway flows without flooding downstream houses.





073 Crest



073 Downslope - Note the tall vegetation on the slope.



073 Outflow - View of the outlet pipe from the reservoir, looking upstream from below the dam. Note this outlet is partially silted in.



073 Outlet - View of the outlet from the reservoir looking from the reservoir.



073 Outpipe



073 Pan 1 - Panoramic view of the reservoir, looking around the inner slope from the reservoir.



073 Pan 2 - Panoramic view of the reservoir, looking around the inner slope from the reservoir.



073 Pan 3 - Panoramic view of the reservoir, looking around the inner slope from the reservoir.



073 Pan 4 - Panoramic view of the reservoir, looking around the inner slope from the reservoir.



073 Pan 5 - Panoramic view of the reservoir, looking around the inner slope from the reservoir.



073 Upslope - Looking from downstream of the reservoir at the downstream slope



073 Upstream - View along the upper slope



073 Valve - outlet pipe and control valve



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RESERVOIR 24

# Vulnerability Index: Extreme High Moderate Low 1 2 3 4

STATE OF HAWAII - DLNR DAM SAFETY INSPECTION SHEET

Inspec	tion No:
Date:	4/05/2006

Inspection Type: Visual Dam Safety Inspection **Phone Number Persons Present** Affiliation US Army Corps of Engineers Weather Condition: ☐ Drizzle / Mist ☐ Cloudy/Overcast ☐ Partly Cloudy ▲Sunny ☐ Rain previous day ☐ Rainy Comments: 1. General: (Information currently on file, update as required) Dam/Res. Name RESERVOIR 24 Hawaiian Commercial & Sugar Company, a division of Alexander & Baldwin, Inc. (C010) Owner Owner Ph. \_ Owner Contact Mr. Randall Moore Lessee Ph. \_\_\_\_\_ N/A Lessee O & M Contractor <u>HC&S</u> O & M Ph. UPPER PAIA 20.89 ° (decimal) Latitude Nearest Town Longitude 156.3583 ° (decimal) MAUI County Tax Map Key(s) \_ (2)2-5-003:010 Hazard Potential H: Dam Size Dam Status 1917 400 ft. Dam Height \_\_\_\_\_ Year Completed Dam Length 60 ac.ft. Max. Surface Area 2.6 28 ac.ft. Max. Storage ac. Normal Storage \_\_\_\_\_ Max. Spillway Q \_\_\_\_\_ 100 cfs Drainage Area 2.27 mi. Spillway Type Owner owns land under dam facility: \_ Emergency Action Plan on file with the Department: NO

Reports on file with the Department: May 1979 = Army Corps of Engineers, Initial Dam Safety Inspection / Survey (2)

Dam ID: <u>MA-0073</u>				Inspection No:
RESERVOIR 24				Date: 4/05/2006
2. Questions for Owner's Rep.:	Yes	No l	Jnknown	Comments
Construction Plans Available	<u> </u>			
Site / Facility Map	S			
Operation & Maintenance Manu	€		<b>S</b>	
Emergency Action Plan		Ø		
Modifications / Improvements				
Conduct Routine Inspections	,EJ			
Conduct Routine Maintenance	ß≿			
Vehicle access to site	<b>1</b>			□ Not accessible ▼With Standard car □ Requires 4-Wheel Drive
Access during heavy rains	<b>S</b>			☐ Not accessible ☐ With Standard car ☐ Requires 4-Wheel Drive
Access when spillway is flowing	<b>D</b>			☐ Not accessible
Other Studies Conducted	23			Phase I □ Phase II □ Hydraulics □ Stability □ Hazard □ Seismic
	_		_	Other:
Incident History	Ø			☐ Breached ► Overtop ☐ Slide ☐ Down stream Flooding
				☐ Other:
Reservoir's Current Use				☐ Sediment ☐ Irrigation ☐ Recreation ☐ Flood Control ☐ Drinking Water
				☐ Power Generation ☐ Other:
modifications, Operation  b. An Emergency Action P  c. An EAP is required for I  d. An EAP is recommende  e. Submit narrative and ad dam site, unless covere  f. Routine inspection logs  g. Dam owners shall provid  h. The dam did not appear  i. Access to site appears to  j. There is no vehicular according access provided.  k. Access to dam is questify and emergency plans not access to promptly advicincumstance or occurred  m. Submit current Operation	ns and lan (EA ligh Had for a ditional	Maint AP) is azard Il dam I infor oprove tot instruction maint atisfact the in e depay which I Main	tenance Months on file with Dams. So the regard the mation of the dam properted. The inspection of the dam site. The dam site of the definition of the may advertenance of the dam site of the	on of the dam.
□ Ph □ Hy □ St: □ □ Ha	ase I State II State	Study Study y and Analys Analys	Hydraulio sis sis fication	g □ Seepage □ Hydrology/Hydraulics □ EAP) cs (including Probable Maximum Flood and spillway capacity)

3. Reservoir:  Level during inspection  Normal Operating Level/Rang  Descriptio  Typical Operation □ Spillwag	00000
Level during inspection  Normal Operating Level/Rang  Descriptio  Typical Operation □ Spillwa	ge ft per (gage / other) flooding (hourseld)
Normal Operating Level/Rang  Descriptio  Typical Operation □ Spillwa	ge ft per 27 (gage / other) ft o ding (has
Li Other.	y always flowing □ Kept within normal range ▲ Kept Empty □ Drained Daily □ Only filled by Storms  **Rep +
Sinkhole in Res.: ☐ # Obse	erved: Size: by in. Deep □ Not Visible ௴None Observe n:
	n:
□ c. The reservoir appeared	to be in satisfactory condition, no corrective actions are required at this time.  to be in fair to poor condition and requires corrective action.  to be in unsatisfactory condition, urgent corrective action is required.
Corrective Actions:	
	naintenance and/or repair. Description:
	ed in the upstream reservoir. Conduct additional investigations and monitoring to and appropriate action.
□ h	

	da i	number of mu	akes					
		ntake Culve	rt / Pipe	ID TO SHANKING TO	,	Compando.	Other Sortee Flo	<b>.</b>
		Size:	in. Ll L	IP LI Corrugated Metal LI F	VC LI HDPE	LI Concrete	Li Other 7 - 1 - 1	
		Control:	☐ Gate ☐ Valve	☐ Flow can either be Shut	off or Bypasse	ed		
		From:	☐ Stream Diversion	n □ Pump □ Reservoir	☐ Other _			
	X	Ditch / Flumo Dimension	e n:	(Size x Depth) Shape	<b>)</b>	SURACE	Flori	
		Surface:	☐ Dirt ☐ Wood	☐ Concrete	☐ Lined w/			
		Control:	☐ Gate ☐ Valve	☐ Flow can either be Shut	off or Bypasse	ed		
		From:	☐ Stream Diversio	n □ Pump □ Reservoir	☐ Other			
Fin	ding	js:						
B	a.	The intake	works were not	inspected.				
-			works were not					
	C.	The intake	works appeared	I to be in satisfactory co	ondition, no d	corrective ac	ctions are required at this time.	
	d.	The intake	works appeared	I to be in fair to poor co	ndition and r	requires cori	rective action.	
	e.	The intake	works appeared	I to be in unsatisfactory	condition, u	irgent correc	ctive action is required.	

Corrective Actions:
☐ f. The intake works needs maintenance and/or repair. Description: \_\_\_\_\_\_

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RESERVO	NR 24	

Inspect	ion No:
Date:	4/05/2006
	•

Ups		am Slope:							Slope			
	SI	ope Protection:	☐ None	☐ Dumped F	Rock [	∃ Fitted Rip Rap	☐ Grouted Rip R	tap ∱ <b>⊠</b> KLir	er		Other: _C	on cre
			☐ Defect	in Protection:	Descript	ion:						
	Er	osion:	☐ Loose s	soil w/ little ve	getation	☐ Rut (<6")	☐ Gully (>6" dee	p) 🗆 <b>N</b> o	t Visible	×	None Ob	served
			Descriptio	n:					····			
	Cr	acks:	☐ Parallel	l with crest	☐ Perpe	endicular to crest	☐ Slide visible	☐ Not \	isible 1	⊋ None C	bserved	
			Descriptio	n:		***************************************		·····	· · · · · · · · · · · · · · · · · · ·			
	Si	nkholes:	☐ # Obse	erved:	Size	•	and	_ Depth	□ Not V	isible	β⊠None	Observed
			Descriptio	n:								
	Ve	egetation:	None	☐ Low Groun	nd Cover	☐ Bushes or Tal	Grass □ Trees	s #	🗆 <6"	□ >6"	& <20"	□ >20"
			Descriptio	n:		·····						
<b>_</b>	-1:											
Fine		gs: The upstream	slone wa	ıs not inspe	ected							
K		The upstream	•	-		tisfactory condi	tion no correc	tive actio	ons are re	equired	at this t	ime
		The upstream		•		•				•	G( 11.10 )	,
		The upstream		•		•	•				nded fu	nction
	u.	Urgent correct				odilordolory oo.		Oxpoore				
_		4. 4										
Cor		tive Actions: Slope protection	on needs	maintenar	nce or re	enair Descripti	on:					
		Rut and/or Gu				•				r repair		
	1.	Description:	•			, the elepe, with	on roquiroo me			, .opa		
	g.	A crack was o				requires furthe	er investigation	to dete	rmine the	e underl	lining ca	iuse.
		Monitor the are		•	•							
	h.	A sinkhole was Repair and mo			lope, wh	nich requires fu	rther investigat	tion to de	etermine	the unc	derlining	cause.
	i.	The upstream maintain low to					d bush vegeta	tion. Cle	ear high v	/egetati	on and	
	i.			•	•	nkment. Trees	have been ide	entified a	s the pro	bably c	ause of	piping
	٠.					mage to the em						
						e tree hazards						
						ı 2" diameter ar						
						per the requirer			echnical	or struc	tural en	gineer.
			ntor the d	amaged ar	ea for S	igns of settlem	ent and seepa	ye.				
	K.											

			4											ate:	_	f( o	5/2	J-06	2
6.	Cre					Vidth: 2							<b></b>				***************************************		
		Acce		□ Loose	one □ Walking Path      Roadway, Surface / Width / Usage:								erved						
		Crad	cks:	☐ Paralle	I with crest	: ☐ Perp	endicular	to cre						Visible	Ď <b>∀</b> 1	None C	Observed	<b>d</b>	
		Sink	tholes:	□	in. Wide on:	x	in.	Long	x		_ in. De	еер	□ Not						
		Veg	etation:			ound Cove										□ >6"	& <20" ———		>20"
		b. T c. T d. T	:: The dam cre Jrgent corre	est appeare est appeare est appeare	ed to be i ed to be i ed to be i	n satisfad n fair to p n unsatis	oor cor	nditio	n and	requ	uires	corre	ective	action.					
	Cor	recti	ve Actions	:															
			Access alon																
			Access alon																
		Ŭ	Rut and/or G Description:	-															
		N	A crack was Monitor the	area and/o	r repair a	as require	ed.												
		F	∖ sinkhole w Repair and i	monitor the	area.														ise.
		r	Portions of t maintain low	to enable	easy vis	ual inspe	ction.												
		f (	Free(s) were allures, and Corrective a of the tree a	can possi	bly cause nuired to	e sever d remove t	amage he tree	to the	e emb irds fro	ankr om th	nent he da	if the am. /	ey are Accep	uproo table r	ted di remed	luring dies ir	a high nclude	wind remo	oval

All repair work shall be accomplished as per the requirements of licensed geotechnical or structural engineer. Routinely monitor the damaged area for signs of settlement and seepage.

Dam ID: MA-0073

Inspection No:

Dam IĎ: MA-0073 RESERVOIR 24	Inspection No:  Date: 405 (200)
	(Typical Slope ±:) □ lower roadway along toe
Cracks:	□ Parallel with crest □ Perpendicular to crest □ Slide visible Not Visible None Observed  Description: □
Sinkholes:	Description: in. Wide x in. Long x in. Deep Not Visible None Observed  Description: in. Wide x in. Deep Not Visible None Observed
Vegetation:	□ None □ Low Ground Cover ► Bushes or Tall Grass □ Trees # □ <6" □ >6" & <20" □ >20" □ >20" □ >20"
Seepage:	Seep Spot Number 1  Green Vegetation  Flowing, Description:  Water Clarity: Glear  Description:  Seep Spot Number 1  Wet or Muddy Ground Glean Ponding Water Not Visible  None Observed  Other:  Description:
	Seep Spot Number 2  Green Vegetation Flowing, Description: Water Clarity: Glear  Seep Spot Number 2  Wet or Muddy Ground Glean Ponding Water Not Visible None Observed Other:
Findings:	Description:
b. The downstread c. The downstread d. The downstread function. Urge	am slope was not inspected.  am slope appeared to be in satisfactory condition, no corrective actions are required at this time.  am slope appeared to be in fair to poor condition and requires corrective action.  am slope appeared to be in unsatisfactory condition and not expected to fulfill its intended ent corrective action is required.
Corrective Actions:  a e. Slope protecti	on needs maintenance or repair. Description:
Description:	observed on the slope, which requires further investigation to determine the underlining cause.
Monitor the ar	rea and/or repair as required.  Is observed on the slope, which requires further investigation to determine the underlining cause.
Repair and m	onitor the area. eam slope was not visible due to high grass and bush vegetation. Clear high vegetation and
g. Tree(s) were failures, and corrective actions of the tree and All repair work	to enable easy visual inspection.  observed on the downstream slope. Trees have been identified as the probably cause of piping can possibly cause sever damage to the embankment if they are uprooted during a high winds. It is required to remove the tree hazards from the dam. Acceptable remedies include removal districture down to a 2" diameter and reconstructing the damaged embankment section. It is shall be accomplished as per the requirements of licensed geotechnical or structural engineer. In the damaged area for signs of settlement and seepage.
☐ h. Seepage/Pon	ding water was observed. Monitor and conduct further investigation to locate the source of tent of any possible hazardous or developing condition.
☐ i. Seepage was action to stop	s observed flowing and particles were observed to be removed by the flow. Take immediate the loss of soil from the embankment. Conduct further investigation to determine the underlining see corrective action. Monitor the area.
A 14	s very steep, around a 1 to 1 slope, further study is required to verify slope stability.

Dam ID: MA-0073	Inspection No:	
RESERVOIR 24	Date: 4/05/200	<u>_</u>
8. Abutments/Toe:		
Erosion:	☐ Loose soil w/ little vegetation ☐ Rut (<6") ☐ Gully (>6" deep) Not Visible None Observed	
	Description:	
Cracks:	☐ Parallel with crest ☐ Perpendicular to crest ☐ Slide visible ★ Not Visible ♣ None Observed	
	Description:	
Vegetation:	□ None □ Low Ground Cover □ Bushes or Tall Grass □ Trees # □ <6" □ >6" & <20" □ >	20"
	Description:	
Seepage:	Seep Spot Number 1	
	☐ Green Vegetation ☐ Wet or Muddy Ground ☐ Ponding Water Not Visible None Observed	
	☐ Flowing, Description:  Water Clarity: ☐ Clear ☐ Some particles ☐ Muddy ☐ Other:	
	Description:	
	Seep Spot Number 2	
	☐ Green Vegetation ☐ Wet or Muddy Ground ☐ Ponding Water ☐ Not Visible ☐ None Observed	
	□ Flowing, Description:  Water Clarity: □ Clear □ Some particles □ Muddy □ Other:	······································
	Description:	
Findings:		
	nts/toe were not inspected.	
	nts/toe appeared to be in satisfactory condition, no corrective actions are required at this time.	
	nts/toe appeared to be in fair to poor condition and requires corrective action.	
	nts/toe appeared to be in unsatisfactory condition and not expected to fulfill its intended function ctive action is required.	•
0.90	outo action to required.	
Corrective Actions		
⊠ e. Slope protect	tion needs maintenance or repair. Description: Need to Remove To 11	
ыт. Rut and/or C Description:	fully erosion was observed, which requires maintenance and/or repair. Gre // /veg	
	observed along the abutments/near the toe, which requires further investigation to determine th	e
underlining of	ause. Monitor the area and/or repair as required.	_
h. The abutme	nt/toe area was not visible due to high grass and bush vegetation. Clear high vegetation and	
	to enable easy visual inspection.	
LI I. Tree(s) were	observed along the abutment/toe. Trees have been identified as the probably cause of piping can possibly cause sever damage to the embankment if they are uprooted during a high winds.	
Corrective a	ction is required to remove the tree hazards from the dam. Acceptable remedies include remov	al
of the tree a	nd its root structure down to a 2" diameter and reconstructing the damaged embankment section	n.
	k shall be accomplished as per the requirements of licensed geotechnical or structural enginee	r.
	onitor the damaged area for signs of settlement and seepage.	
ы ј. Seepage/Po water and ex	nding water was observed. Monitor and conduct further investigation to locate the source of tent of any possible hazardous or developing condition.	
	s observed flowing and particles were observed to be removed by the flow. Take immediate	
action to sto	the loss of soil from the embankment. Conduct further investigation to determine the underlin	ng
cause and ta	ke corrective action. Monitor the area.	9

Dam ID: RESERV								Inspecti Date:		05/2006
9. Out		<b>Norks:</b> Ivert / Pipe Type / Size:		~ <sup>U</sup> (	<u> </u>					
		Culvert:	☐ Concre	te 🗆 Mas	onry	☐ unlined earth	□ Other			
		Pipe:	XI.DIP	☐ Corre	ugated Metal	□ PVC □ HDP			***************************************	
		Control Type:	☐ Gate	<b>∀</b> Valve	e □ Oth	ner <u>Ce ff</u>	0 ps	Les		
		Location:	☐ Contro	l on Upstrean	4	ntrol on Downstream s				
		Seepage:		Vegetation		uddy Ground 🛚 Pond	ling Water □ I	Not Visible	None C	Dbserved
						rticles   Muddy	□ Other: _			
			Description	on:						
Find	a. b. c. d.	The outlet wor The outlet wor The outlet wor The outlet wor	ks were ks appea ks appea	not tested. ared to be i ared to be i	n satisfacto n fair to poo	ry condition, no co or condition and rec otory condition and	quires corre	ctive action	٦.	
		Urgent correct								
•		ti Antinum								
		tive Actions:	tina wate	ar was ohsi	erved Conc	duct further investi	gation to loc	cate the so	urce of w	ater and extent
لسا	ı.	of any possible	e hazard	ous or dev	eloping con	dition.	90			
		Seepage was action to stop corrective action and a	observed the loss on. Mon are cons	d flowing a of soil. Co itor the are idered to b	nd particles nduct furthe a. Failures e a dangero	were observed to r investigation to d caused by seepag us situation.	letermine th ge/piping ald	e underlini ong the out	ng cause let condu	and take it are very
	h.	Were not visib easy visual ins			s and bush v	vegetation. Clear	high vegeta	tion and m	aintain lo	w to enable

RESERVOIR 24		Date: 4/0//2006
S. Nys		
10. Spillway:		
Type:	☐ None Culvert/Pipe ☐ Channel	
,,	Description: Weir into Culvert	
Dimension:	5 × × × ft. Invert elevation:ft. pe	
		Grouted Rip Rap Concrete
Glopo i rotoction.	□ Defect in Protection: Description:	/*
Annragah:	•	
Approach:		
Erosion:		Other:
	Description:	
Vegetation:	% Pone □ Low Ground Cover □ Bushes or Tall Grass □ Trees #_	
	Description:	
Findings:		and the second of the second
	appeared to be in satisfactory condition, no corrective actions	•
•	appeared to be in fair to poor condition and requires corrective	
c. The Spillway a corrective action	appeared to be in unsatisfactory condition and not expected to	5 fulfill its intended function. Urgent
corrective active	on is required.	
Corrective Actions:		
□ d. Slope protection	on needs maintenance or repair. Description:	
□ e. The spillway a	pproach was blocked. Clear approach.	
☐ f. Severe scour e	erosion was observed which requires maintenance and/or re	pair.
Description:		
☐ g. A headcut (ver	rtical drop in channel due to erosion) was observed downstre	am of the spillway. Corrective
action is requir	red to prevent this problem from moving upstream.	
	cceptable in the spillway channel and approach. Take correc	tive action to address the woody
	blem and repair the damaged area.	
•	way is adequately sized. Spillway should pass the probable r	maximum flood. Verify spillway
capacity and to	ake corrective action as required.	1 3 0
	<del></del>	· *
<i>,</i> **	and the same of th	en ye ye
11. Down Stream Chani	•	Sell and the
Name:	•	
	☐ Sump ☐ Open Area ☐ Un-Defined Drainage-way   □ Defined Draina	ge-way   Other
•	am Bank: □ None □ Road 15-Houses □ Town	☐ Not Inspected
Description:		
Finalinan.		
Findings:	am channel was not inspected.	
1	am channel appeared to be in satisfactory condition, no corre	ective actions are required at this
time.	an channel appeared to be in satisfactory condition, no corre	ctive actions are required at this
	am channel appeared to be in fair to poor condition and requi	res corrective action.
	am channel appeared to be in unsatisfactory condition and no	
	ent corrective action is required.	
•	·	
Corrective Actions:		
□ e. <u>DownSik</u>	CHANNER IS TOO SMALL AND FROM STILL WAY RELEASE	-2002 HLAZE 2
DURING C	OUTLET WORKS AND SPILLMAY REVEASI	3. RESERVOIR KAPT
De 1 Th 0	AVOID DE IMPACTS	

Dam ID: <u>MA-0073</u>

Inspection No:

Dam ID: MA-0073 RESERVOIR 24		Inspection No:
Additional Comments: On the date of this limited visu	al inspection, there appeared to be no immediated to be no immediated to be no immediated.	te threat to the safety of the

lam. No assurance can be made regarding the dam's condition after this date. and other factors may affect the dam's condition.	SVALSTRA	servi CHANNE
Reservoir Kept dry because of potential to over to	opy. The	Janually
appears to be too small more is a rigaro ecco	Line Diggs	
immediately down stream of the embankment:	M 21 TAHT	o ron car usa
RESERVOIR IS KEPT DRYSINCE DOWNSTREAM CHANN	C 15 INA	DEOMIE
TO PASS OUTLET WORKS AND SPILLMAY FLOWS		T FLOODING
DOWNSTRAFING HOWES.	Self-sulf-durante Self-straff (April 18 de self-straff 18 ) and 18 (April 18 ) and 18 (Ap	e gage e la companya ya gaga e sana sa na
	goggaponymynya ngalandar artin ani imi i imi i ini i i	

### Limitations and Intent of this Dam Safety Inspection:

This Dam Safety Inspection was conducted to assess the general overall condition of the reservoir/dam, identify visible deficiencies, and recommend areas of for monitoring, additional investigative studies and corrective actions. The inspection is based only on visible features/areas of the dam on the day of inspection. This inspection is not a formal phase I or phase II dam safety inspection and does not include a review or evaluation from each specialist of an inspection team, such as a geologists, civil, geotechnical, structural, or hydraulics engineer. The owner should verify the findings of this report and take corrective actions. The owner may submit to the State alternative corrective actions that are certified by a licensed professional engineer in the State of Hawaii experienced in the design and construction of dams. This inspection does not relieve the owner/operator from their responsibility to conduct routine inspections, maintenance, repairs, modifications, monitoring, documentation, and/or investigative studies. The inspection was conducted under the authority of the Hawaii Revised Statures Chapter 179D, and Hawaii Administrative Rules, Title 13, Chapter 190, titled "Dams and Reservoirs". Questions regarding this inspection should be forwarded to the Hawaii State Dam Safety Program; PO Box 373; Honolulu, Hawaii 96809; Ph. (808) 587-0236.

Revised: Dec. 1, 2003